Forest Pest Management

Pacific Southwest Region

Lat 41.85318 Lon -120.18612

Date: September 22, 2000
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To: Tribal Leader, Fort Bidwell Indian Reservation

Subject: Biological evaluation of forest stand conditions related to insects and diseases (Report # NE00-19).

At the request of personnel from the Tribe and from the Bureau of Indian Affairs office in Redding, CA, a field evaluation was conducted by Forest Pest Management (FPM) on August 29, 2000. FPM personnel included Sheri Smith, Supervisory Entomologist, Bill Woodruff, Plant Pathologist, Rick Turcotte, Entomologist and Danny Cluck, Biologist. We were accompanied in the field by Allan Jones, Certified Forester, representing the Tribal Community, Bill Saffell, Forester, and Jose Merjil, Fire Management Officer, both from the B.I.A. office in Redding, CA and Dave Evans, District Silviculturist, Warner Mountain Ranger District, Modoc National Forest. The objective of the field visit was to assess the current stand conditions and determine if FPM prevention/suppression funds would be appropriate to assist with project planning and implementation.

Background

The Fort Bidwell Indian Community is located on the eastern slopes of the Warner Mountains in Modoc County. There are 1,745 acres of forested lands within the 3,240 acre Reservation. The forest is dominated by white fir and ponderosa pine with an understory of almost pure white fir. Incense cedar and lodgepole pine are minor components. Juniper is present in the lower elevations and can also be found as a minor component in higher elevation stands. Quaking aspen and cottonwood trees can be found in moist areas. The forested area ranges in elevation from about 5,200 to 7,400 feet. The two main watersheds are Venning and Soldier Creek. The springs at Soldier Creek provide the domestic water to the Community. Annual

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average precipitation ranges from 20 inches at the lower elevation up to <35 inches along the western edge of the forest. Site indices range from a Dunning II to V (FMP).

Historically, the forests in this area were dominated by pine trees with a minor component of white fir. The present stands are typical of many areas in the eastside pine type that are overstocked with small diameter more shade tolerant trees with high levels of canopy closure. Over time these conditions have resulted in unacceptable levels of conifer mortality and buildup of fuels within the Community forest. To address these conditions 1,035 acres of overstocked stands have been identified for vegetation management projects (Fort Bidwell Forest Management Plan, further referred to as FMP). The primary objective of these projects is to harvest the dead, dying and suppressed trees leaving a residual pine stand at a basal area that is appropriate for the site and is less susceptible to impacts from disturbance agents such as insects, diseases and protracted dry periods.

Previous FPM evaluations have documented conditions relating to insects and diseases within the Community forests dating back to 1969 (Dasmann, 1969 and Vogler, D., and J. Dale, 1982). The 1969 evaluation was conducted following a high level of white fir mortality which occurred in the early 1960's. The mortality was attributed to the fir engraver beetle, *Scolytus ventralis,* in concert with several years of below normal precipitation. Dwarf mistletoe in white fir, *Arceuthobium abietinum,* f. sp. *concoloris* was also noted in this report. The objective of the 1982 evaluation was to determine the causes of tree mortality and provide input on how past insect and disease conditions might affect the Tribe's long-term forest improvement program. Agents documented in the 1982 FPM report included the fir engraver beetle, the mountain pine beetle, *Dendroctonus ponderosae*, in ponderosa pine, annosus root disease caused by the fungus *Heterobasidion annosum*, affecting ponderosa pine and white fir, dwarf mistletoe in white fir, and *Cytospora abietis,* causing branch dieback on white fir trees.

Current Conditions

Soldier Creek

As mentioned above this watershed provides the domestic water for the Community. In the area where we stopped there was one large dead ponderosa pine and Allan Jones, representing the Community, expressed that there was concern about a bark beetle outbreak killing the remaining large pines in the area. Mountain pine beetles were found attacking this tree however the beetles should not be the primary concern. The area is extremely overstocked with white fir in the understory and these trees are out competing the older ponderosa pines for water and nutrients. If the objective in this area is to maintain the ponderosa pines, some stocking reduction activities need to be implemented around the ponderosa pines to reduce competition and decrease their susceptibility to bark beetle attacks.

Aspen Stands

Many of the aspen stands we drove through appear to be in decline. Conifer species have encroached into several of the stands and aspen canopy cover and regeneration have been greatly reduced. As you are aware, aspen ecosystems have a greater diversity of plants and animals than most other systems in the West. They are important for watershed protection and yield more water and produce more forage than areas that have been converted to conifers. Risk factors

have been developed for the Interior West to prioritize areas with aspen for restoration and conservation actions. A more detailed survey may be appropriate to determine what risk factors are present and what management options are available.

General Forest

Many of the stands we examined have high levels of old white fir mortality that occurred during the late 1980's and early 1990's as a result of interactions between stand conditions, insects, diseases, and the protracted dry period that occurred between 1987 and 1994. The mortality is contributing to high levels of standing and down fuel, and presents a management challenge in terms of how to pay for and remove the material from the stands. In addition to the past mortality, we observed recent whole tree, top kill, and branch dieback in white fir and a limited amount of ponderosa pine mortality. The primary agents involved are the same as those noted above with the addition of Sequoia pitch moth. This moth was found attacking the ponderosa pines at the lower elevations, but is not expected to cause any mortality. Although insects and diseases are often the factors implicated in causing the mortality, in the stands that we observed there are several other underlying factors that should be considered when evaluating stand conditions and discussing management opportunities.

Historically, the most significant, widespread, weather-related effect on the vegetation in California has been conifer mortality associated with severe moisture stress. Conifer mortality tends to increase whenever winter precipitation is less than about 80% of normal. Trees stressed by inadequate moisture levels have their normal defense systems weakened to the point that they are highly susceptible to attack by bark, engraver, and wood-boring beetles. Bark and engraver beetle-related mortality occurs primarily in small groups with the pine bark beetles or as single trees scattered over several hundreds of acres with the fir engraver. Successful attacks by the pine bark beetles (western, mountain and Jeffrey pine beetles) result in tree mortality. Successful attacks by the fir engraver (white fir) can result in top-kill, branch kill, and patch kills along the bole and/or whole tree mortality. In general, mortality occurs in overstocked stands, however, during periods of protracted drought, mortality may be expected to occur throughout various stocking regimes.

Individual conifer species can grow under a range of precipitation regimes. Land managers should be cognizant of these precipitation regimes when developing land management objectives based on existing vegetation. Objectives may not be attainable if species have established in the wetter or drier extremes of their ranges since these sites will not likely be suitable for the duration of the tree's life, therefore, the species will not be sustainable over time. Based on the isohyetal map of mean annual precipitation the normal precipitation ranges from 20 to <35 inches a year with the higher precipitation being received in the western part of the analysis area (Source: Rantz, S.E. 1969. Mean Annual Precipitation in the California Region. U.S.G.S. Menlo Park, CA). These maps represent broad averages of conditions over large areas (See attached map and overlays). Microsites, which are very different from the broad average, probably exist within the isohyetal bands.

A minor component of other conifer species exist throughout the analysis area but white fir and ponderosa pine are the prevailing species. Each species of vegetation has a competitive advantage along the soil moisture gradient. Various weather patterns, in combination with management practices (ie. fire suppression, harvesting practices) can enable different species to

occupy various sites for many years or centuries. This is likely the case for several areas in the Fort Bidwell forest. Regardless of the mechanisms that were involved in the development of the current vegetation, the following conclusions can be made about the existing condition:

1) White fir is much more predominant than likely existed prior to European settlement.

2) White fir is present in areas which under normal conditions receive precipitation that is near the lower limit for these species.

3) Existing stocking levels are higher than most sites can maintain through protracted dry periods.

These conditions do not lend themselves well to being able to withstand the frequent occurrence of below normal precipitation periods experienced in California. Some trees have developed in areas where even the normal annual precipitation is less than what is needed to sustain the species over its life time. When normal or above normal precipitation is not received species growing in these areas become drought stressed. This stress is exacerbated by overstocked growing conditions. Conifer species which are growing in areas that receive less than their optimal limit of precipitation, are more susceptible to insects, diseases and weather disturbances. White fir trees have increased in size and number over the past century, however, during certain periods precipitation has been extremely limited. The result of the interactions between these factors has been unacceptable levels of mortality over very large areas. Short term attainment of some of the management objectives for the Fort Bidwell forests have been severely impacted by the altered forest conditions.

California white fir grows in cold, high elevations and in warm to hot, low elevations (Silvics of North America, Vol. 1 Conifers, U.S.D.A. Agricultural Handbook 654). The best stands of white fir develop in areas receiving 40 - 50 inches per year. The lower limit of precipitation for sustaining white fir is 20 inches per year (Silvics of Forest Trees of the United States, U.S.F.S. griculture HandboAok 271). Although white fir may be found in areas that receive less that 20 inches per year, it is not biologically realistic to manage it as a resource on those sites. White fir existing in areas receiving <30 inches of annual precipitation are at the lower limit of their range during normal precipitation periods. When conditions such as protracted drought or overstocking occur, white fir become predisposed to attacks by the fir engraver. During relatively wet periods, similar to those experienced over the past 100 - 200 years the more shade tolerant white fir has established, and in some cases, has lived long enough to achieve co-dominance and dominance in crown position, however, the sustainability of the majority of these trees is not likely. This is evidenced by the existing high level of mortality. These areas (20-25 in. annual precip.) should be viewed as being at extreme risk to high levels (in excess of 30% of the stand and up to 100%) of mortality during protracted drought periods.

Factors such as soil nutrients and moisture, historical and current vegetation types, available light, topography and other environmental features can be useful for identifying potential productivity and to provide a frame of reference for determining land management goals and objectives and ultimately management activities. Based on available moisture alone, it can be expected that levels of true fir mortality will be higher in areas where species are growing at the lower limit of their environmental requirements. During protracted dry periods the mortality

levels will increase in the lower precipitation areas at the onset of the drought and then extend into the higher precipitation areas if the drought continues. White fir mortality levels will be highest in areas that are near or below the lower limit of annual precipitation and decrease as the annual precipitation approaches optimum levels for growth and sustainability. Optimum levels of precipitation for growth and sustainability of white fir do not exist within the Fort Bidwell forest. An exception may be the extreme western boundary of the forest but caution should be taken in this area as well if an attempt is going to be made to maintain a species composition that is dominated by white fir.

Management objectives should emphasize pine and other more drought tolerant species in these areas. Some white fir will survive long periods in this area as evidenced by several large trees, however, management objectives should not attempt to maintain this species as a major stand component. If there is a desire to retain the residual large, live, white fir, it may be necessary to thin around these trees to reduce competition for available soil moisture, however, some of the literature shows that even a heavy thinning on some sites does not ensure that white fir will be the sustaining species.

Effects resulting from bark beetles and diseases may include the following: direct tree mortality, openings that vary in size, less trees/acre, reduced canopy closure, increase in standing dead and down woody material, increase in fuel load, increase in decomposition and nutrient cycling, increase species diversity/decrease species diversity, increase in snags and cavity nesting opportunities and a change in species composition. The importance or significance of these effects depends on their severity and extent and ultimately how they affect (positively and/or negatively) ecosystem structure and function (desired condition) and specific management goals and objectives. The effects of insects and diseases can be used as an indicator of forest and ecosystem health.

Management Alternatives

The following may be used to develop management alternatives leading in the direction of a desired future condition.

(1) No action - Overstocked stands in general will have higher levels of bark and engraver beetle-related mortality. Annosus root disease centers will continue to enlarge and regeneration within the centers will probably die. With no management, the areas of extreme mortality present a fire hazard. The basal areas in stands will continue to increase as the trees grow. Periodic droughts in California increase the probability that many of the trees (particularly the white fir) in overstocked stands will be attacked by bark beetles. Mortality levels will typically be above background levels as stand density increases, and this affect will be accentuated during periods of below normal precipitation. Although some mortality may be desired for snags, small openings and for future down woody debris, the no action alternative will result in unacceptable levels of mortality

The direct result of an increase in tree mortality is the increase of standing dead (snags) and down woody material. This may result in: a continuing desire to enter stands to conduct salvage operations, an increase in fuel loading, a short term increase in nutrient cycling, an increase in the number of hazard trees and fewer large, older trees and fewer of the mid-diameter trees that represent the pool from which the large trees and snags of the future come from,

(2) Salvage - Salvage sales can minimize the economic loss and reduce the amount of dead fuel, however, these operations will have no effect in reducing or controlling bark beetle populations. Salvage alone without lowering the basal area and altering the species composition of the residual trees will result in continued mortality in overstocked areas. This will be exacerbated during protracted dry periods. It is doubtful that the dead white fir has much economic value remaining at this point, however, it is critical for fuels reduction and future stand management that as much of the dead material as possible be removed. Obviously some amount of dead material is important for wildlife habitat but continuous recruitment of that component does not seem to be a problem at this point based on current stand conditions. Combining salvage removal with some green timber removal may help offset the cost of removing the material that has no economic value. Some reforestation may be required in large openings.

(3) Thinning Overstocked Stands - Management activities that promote tree health and vigor also reduce the susceptibility of successful bark beetle attack and disease related mortality. Thinning is perhaps the most critical silvicultural treatment available to restore and maintain tree health. Thinning from below reduces flammable fuels, and creates growing space for trees. Silvicultural prescriptions designed to reduce basal area, select against off-site tree species and remove dwarf mistletoe infested trees, should result in lower levels of mortality in the future. Reduced mortality would also have the effect of a reduction in the occurrence of understocked stands that would have low canopy closure. Mortality would continue to occur and fluctuate in response to the amount of available moisture, but at levels that, through time, would more closely approximate naturally occurring mortality levels. Thinning would result in: a decrease in the need to enter stands to conduct salvage operations, a decrease in the amount of fuel loading and a reduction in the number of hazard trees. Snags, down woody material and nutrient cycling would occur at more natural levels. The improved growing conditions should result in reduced mortality of large diameter trees and an increase in mid-diameter trees available to grow into large diameter classes.

- In the short term, leave the trees with the healthiest crowns and favor pine species to meet the basal area objective (See report by Dave Evans, dated August 30, 1999 for basal area guidelines). In the long term, conversion of the stands back to a pine dominated type would be favored for most of this area.
- Select against firs near annosus root diesease centers.
- Remove trees with high dwarf mistletoe ratings. This may require removal of some of the overstory trees and creating barriers to prevent continued re-infection from overhead.
- Treat freshly cut stumps with a borate compound to prevent new disease centers from starting. This will have no effect on established centers. FPM recommends treating all conifer stumps with the fungicide Sporax. While many land managers routinely use Sporax when harvesting pine stands, application in true fir sites is often questioned because of the difficulty in assessing exactly how much disease is established prior to harvest. Although it is effective in preventing infection, its exact benefit in terms of economics or stand productivity cannot be determined. Since this disease primarily acts as a decay in true firs and kills them much more slowly than it kills pines, stocking control for optimum growth may be the best way to limit its effects in fir stands.
- Refer to FPM report 82-23 for biologies of insects and diseases and also for tips on reducing logging injuries in true fir stands.

- As a general rule, during periods of above normal tree stress, it is recommended that logging, thinning and timber stand improvement work be minimized as much as possible to reduce the potential for additional stress. Where such activities must occur, extra care should be taken to prevent damage to residual trees.

Prevention/Suppression Funding

As you are aware, FPM has prevention/suppression funds available on a competitive basis for management activities on Tribal lands. Bark beetle prevention thinning and dwarf mistletoe suppression projects would certainly pertain to the Fort Bibwell forests. Project proposals can include funding requests for surveys, required environmental documentation and monitoring, and actual project implementation. I would be happy to work with you in the near future on some specific proposals for funding in subsequent years. I have included some examples of recent proposals that will assist you in preparation of proposals specific to your stands. Please make sure that I have reviewed your proposals prior to submittal to your Regional Office.

If you have any questions regarding this evaluation or request additional assistance please contact me at 530-252-6667.

Sheri Lee Smith
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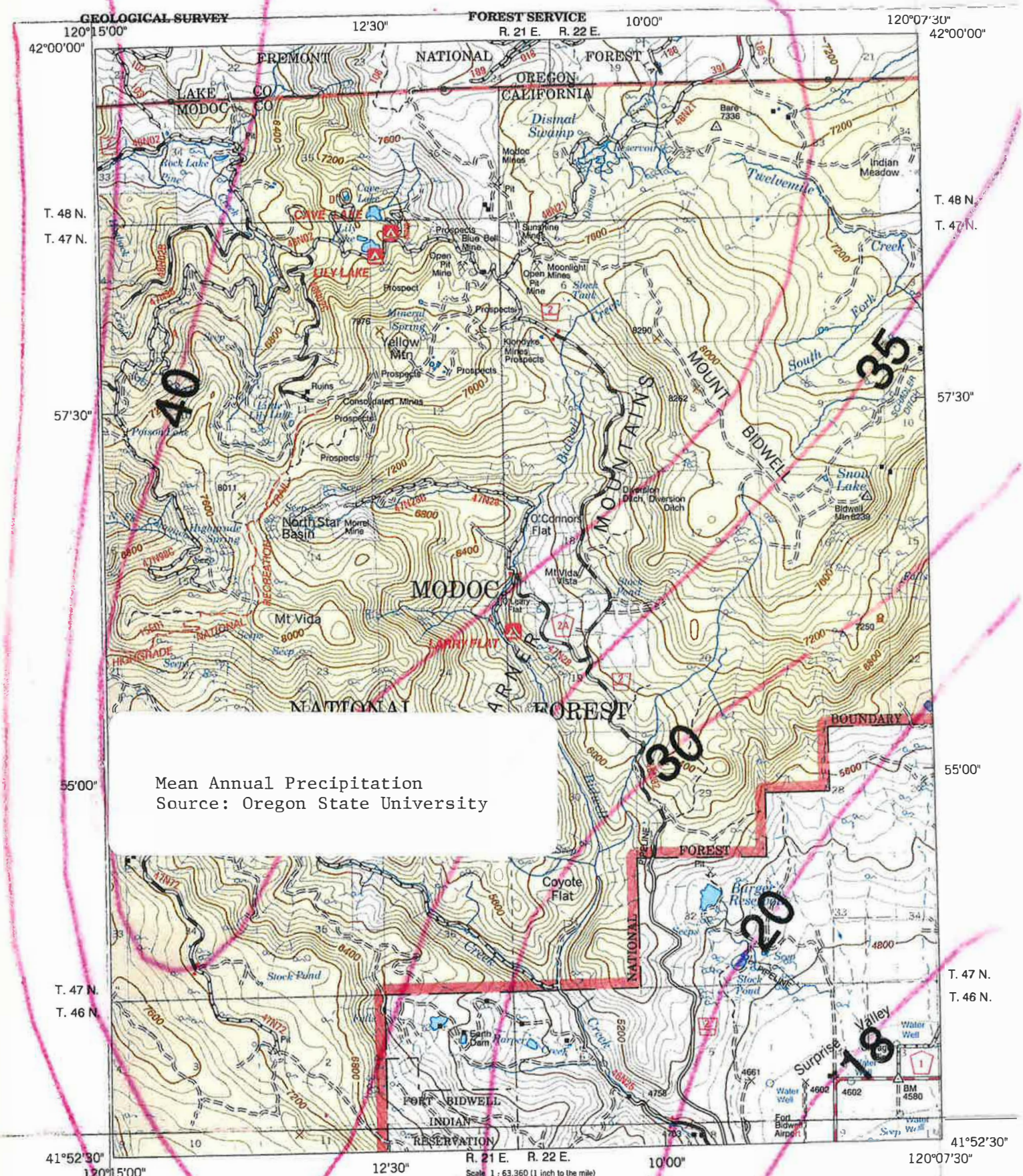
NE CA Shared Service Area


GEOLOGICAL SURVEY
FOREST SERVICE
120°15'00"
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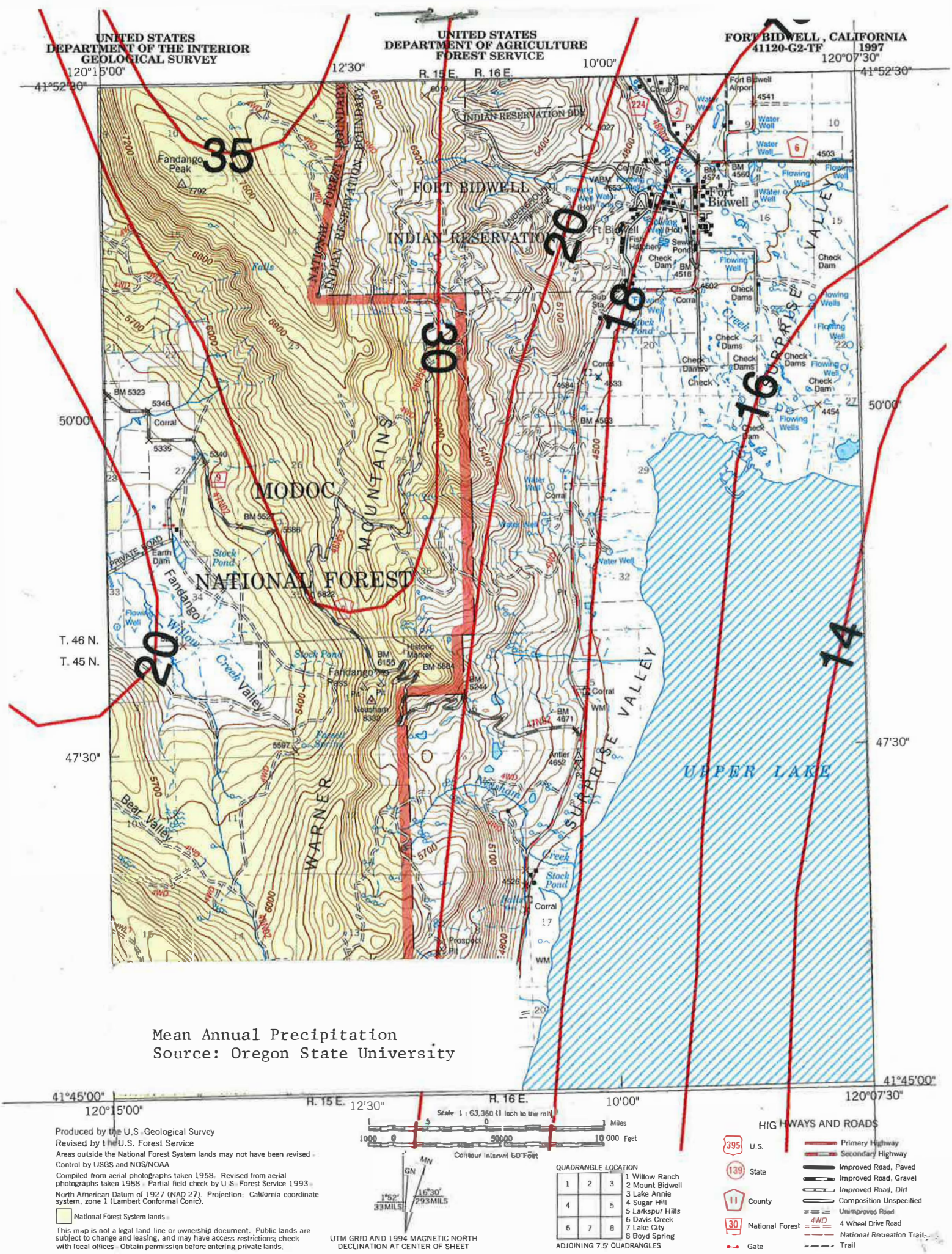
R. 21 E.
R. 22 E.
10'00"
120°07'30"
42°00'00"
FREMONT
NATIONAL
FOREST
OREGON
CALIFORNIA
LAKE CO
MODOC CO
Dismal Swamp
Modoc Mines
Bare 7336
Indian Meadow
Twelvemile Creek
Cave Lake
CAVE LAKE
LILY LAKE
Prospects
Blue Bell Mine
Open Pit Mine
Sunshine Mines
Moonlight Open Pit Mine
Mineral Spring
Yellow Mtn
Klondyke Mines Prospects
Ruins
Consolidated Mines
Prospects
Poison Lake
North Star Basin
Morrel Mine
Highgrade Spring
RECREATION TRAIL
NATIONAL SCENIC TRAIL
Seep
Spring
MODOC
Mt Vida
O'Connors Flat
Mt Vida Vista
Stock Pond
LARRY FLAT
Diversion Ditch, Diversion Ditch
Bidwell Mtn 6239
Snow Lake
MOUNT BIDWELL
BIDWELL MOUNTAINS
South Fork
SCHEELER DITCH
ARNETT
NATIONAL FOREST
BOUNDARY
Coyote Flat
Creek
Stock Pond
Earth Dam
Reservoir
PIPELINE
FORT BIDWELL INDIAN RESERVATION
Surprise Valley
Water Well
Ford Bidwell Airport
BM 4580
T. 48 N.
T. 47 N.
T. 46 N.
57'30"
55'00"
41°52'30"
40
35
30
20
19
18
Mean Annual Precipitation
Source: Oregon State University
Produced by the U.S. Geological Survey
Revised by the U.S. Forest Service
Areas outside the National Forest System lands may not have been revised.
Control by USGS and NOS/NOAA
Compiled from aerial photographs taken 1958. Revised from aerial photographs taken 1988. Partial field check by U.S. Forest Service 1993.
North American Datum of 1927 (NAD 27). Projection: California coordinate system, zone 1 (Lambert Conformal Conic).
National Forest System lands
This map is not a legal land line or ownership document. Public lands are subject to change and leasing, and may have access restrictions; check with local offices. Obtain permission before entering private lands.
Scale 1 : 63,360 (1 inch to the mile)
1 .5 0 1 Miles
1000 0 5000 10 000 Feet
Contour Interval 80 Feet
GN MN
1°52' 33MILS
16°30' 293MILS
UTM GRID AND 1994 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
QUADRANGLE LOCATION
1 Crane Creek
2 Crane Mountain
3 Collins Rim
4 Willow Ranch
5 Lake Annie
6 Sugar Hill
7 Fort Bidwell
8 Larkspur Hills
ADJOINING 7 5' QUADRANGLES
HIGHWAYS AND ROADS
395 U.S.
139 State
11 County
30 National Forest
Gate
Primary Highway
Secondary Highway
Improved Road, Paved
Improved Road, Gravel
Improved Road, Dirt
Composition Unspecified
Unimproved Road
4WD 4 Wheel Drive Road
National Recreation Trail
Trail



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